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September 3, 1999

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

By Hand Delivery

Ms. Magalie Salas, Secretary
Federal Communications Commission
The Portals TW-A325
445 12th Street, SW
Washington, DC 20554

Re: 1998 Biennial Regulatory Review -- Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices
ET Docket No. 98-42

Dear Ms. Salas:

Pursuant to Section 1.1206(a)(2) of the Commission's Rules, and on behalf of Fusion Lighting, Inc., this letter is to report written ex parte communications in the above-referenced proceeding.

On September 3, 1999, Fusion Lighting delivered the enclosed document to Julius Knapp, Karen Rackley and John Reed of the Office of Engineering and Technology.

Very truly yours,

Kent Kipling
Senior Vice President

KK/p
Enclosures

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September 3, 1999

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Technical Rules Branch

Dear Julius, Karen and John:

The enclosed document is a follow up to the discussions at our meeting on August 25, 1999 and responds to the Part 15 Interests' June 2, 1999 proposal.

Please do not hesitate to call if you have any questions.

Very truly yours,

Kent Kipling
Senior Vice President

KK/p
Enclosure

CC: Office of the Secretary, FCC
Terry G. Mahn, Esquire
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Fusion Lighting, Inc. ("Fusion") Comments And Suggestions Re: June 2, 1999 Proposal By Part 15/MSS Interests[1] To Impose RF Emission Limits On RF Lighting September 2, 1999

Summary and Conclusion

The Proposal may give political cover to spectral cleansing, but it cannot even slightly reduce the potential for interference between RF Lighting and Spread Spectrum systems in the Band. The magnitude of the proposed limit on RF emissions is already met by standard RF Lighting equipment that the proponents loudly say they "cannot tolerate" and is their "worst case from a communications point of view". The Proposal is technical nonsense as to interference, and disingenuous nonsense at that. The proponents also know that the other elements of their Proposal would impose requirements that literally and unarguably cannot be met with technology that is practical now or likely to be practical in the foreseeable future, and which would not reduce interference in any case.

The Proposal must be read as an effort to render RF Lighting impossible in order to eliminate it from the marketplace. FCC approval of the Proposal or the preceding proposals, or any brokered "compromise" based on them, will yield exactly that result. Further, it is now clear an abject failure of spectrum management is imminent under current rules. If Spread Spectrum devices with their now-admitted vulnerability to RF Lighting are massively launched, unavoidable interference will eliminate any coherent market for Spread Spectrum or for RF Lighting, and possibly for both. The FCC therefore must now prohibit the certification and distribution of any Part 15 devices that cannot assuredly maintain peak performance when operating in close physical proximity to RF Lighting sources ("RF Lamps").

These judgments are harsh. Regrettably, they are fully justified forced not only by Fusion's own analysis of the Part 15/MSS proposals but also by the public record that the proponents themselves have created, including their own technical analyses. The world's largest, richest and most commercially and technically sophisticated communications technology companies seek to acquire dominance of the Band's 100 MHz of extremely valuable spectrum, without cost, without competition, and in flat contradiction of their own assurances to the contrary over at least 15 years. Their success also would contravene the treaty obligations of the United States, since the Band was established by treaty to ensure that innovative industrial, scientific and medical applications would have a home free from challenge and complaint by spectrum-hungry telecommunications applications.

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[1] The June 2, 1999 proposal (the "Proposal") is the fifth standard that Part 15/MSS interests have proposed to limit the RF emissions of magnetron-driven RF Lighting ("RF Lighting") to facilitate Part 15 spread spectrum wireless communications ("Spread Spectrum") in the Industrial, Scientific and Medical Band at 2.4 to 2.5 GHz (the "Band"). On December 1, 1998, some of them asked for peak limits of 1 mV/m at 3 meters indoors and 10 mV/m at 3 meters outdoors. On December 23, 1998, their request was amended to 20 mV/m (also peak) indoors and outdoors. On March 2, 1999, all of them proposed a peak limit of 20 mV/m at 3 meters across the entire band, or, alternatively, 1 mV/m at 3 meters from 2.400 to 2.4785 GHz and from 2.4835 to 2.500 GHz and 330 mV/m at 3 meters between (all peak).

RF Lighting and Spread Spectrum communications are potentially ubiquitous technologies that are fundamentally incompatible in the same spectrum. RF Lighting must emit a few watts in the Band, where it and technically similar systems have operated safely and compatibly for thirty years. In 1985, Part 15 systems were admitted to the Band on a subordinated basis, which requires that they accept interference from senior, authorized users like RF Lighting. Now, however, certain Part 15 Spread Spectrum devices are being introduced which their makers admit cannot do so. At least two systems which are about to be deployed on a massive scale cannot accept interference from RF Lamps operating within 308 meters, according to the proponents' own experts, and up to a half-mile or more, according to Fusion's. Two or more collisions are imminent:

> Bluetooth -- a consortium of 700 semiconductor, computer and telecommunications equipment makers led by Intel, IBM, Ericsson, Nokia and Toshiba – will shortly saturate markets with millions upon millions of Spread Spectrum receivers built into computers, cellular telephones, pagers and electronic appliances of all kinds. Total mobility -- the ability to use them anywhere and everywhere -- is their most attractive characteristic. Bluetooth has advised the FCC that those receivers must be at least 308 meters from a single RF Lamp in order to avoid interference. Fusion estimates that a mean 360 meters' physical separation would be required under the same assumptions, and that separations of a half-mile or more would be required to avoid interference from the multi-lamp installations that are more typical.
>
> Metricom, another prominent Part 15/MSS group member, is about to take at least $650 million from MCI Worldcom and $300 million from Paul Allen/Vulcan Ventures in order to accelerate the installation of Spread Spectrum "local loops" on utility poles throughout 35 major US cities.

Fusion fully agrees that these Spread Spectrum systems cannot tolerate RF Lamps operating in close physical proximity. Depending on the configuration, a single RF Lighting system in a typical high-rise office building could easily neutralize Bluetooth receivers throughout that building or for many blocks around it. And there can be no coherent market for RF Lighting that must be operated at any significant minimum distance -- not to mention 300 meters or a half-mile away -- from "anywhere and everywhere" in the United States or from every utility pole in 35 major American cities. (Ironically, lighting the streets from those same poles happens to be a major opportunity for RF Lighting and for municipal budgets.)

Fusion believes that the FCC should -- and for technical, legal and equitable reasons Fusion believes that it must -- immediately prohibit the certification and distribution of Spread Spectrum devices that cannot assuredly maintain peak performance when operating in close physical proximity to RF Lamps. The recent disclosures establish that Part 15 applicants supplied a false predicate to the FCC in 1985 when they said that they could and would accept subordinate status in the Band, and that Part 15

usage need not and would not limit the industrial, scientific and medical operations for which the Band was created. Upon admission, Part 15 devices were expected to operate at low power with processing gain that would ensure non-interference to and from senior authorized users, as the FCC said then and repeatedly has reaffirmed since. Nevertheless, the Part 15 applicants continued to develop Spread Spectrum technology, engineer products and cultivate markets that they knew could not honor that limitation. Now, pointing to their large investment with the fingers of unclean hands, they press the FCC to radically circumscribe and effectively eliminate RF Lighting because it is in their way. Fusion will oppose that result with all available means, but will be forced to abandon RF Lighting if the FCC approves (and the Courts affirm) any of the Part 15/MSS proposals or the FCC and the Courts allow certification and distribution of Part 15 devices that cannot assuredly maintain peak performance when operating in close physical proximity to RF Lamps.

Whether the Part 15 applicants deliberately misled the FCC to gain admission or later discovered that the conditions of admission were too limiting, it is for them to devise and to bear any cost of a solution to the problem that they created. If there is no solution, they must accept the consequences of misadventure and the erroneous design of impractical products. Their proposals to date would transfer that burden to Fusion, which developed RF Lighting with significant taxpayer support. The proposals are technically and commercially unworkable, self-contradictory and self-serving; at least one element of each would make it literally impossible for RF Lighting to function and, those elements aside, the remainder of the Proposal would fail to reduce potential interference even slightly. No Part 15/MSS proponent has yet revealed a single engineering or other option to enable Spread Spectrum devices to maintain peak performance with RF Lamps operating in close physical proximity. It is beyond Fusion's expertise or responsibility to know what they may be, but numerous engineering options typically do exist when such sophisticated firms make very large technology investments. Metricom, for example, has told the Securities and Exchange Commission that it believes that it can overcome RF Lighting interference without FCC action, but has not told either Fusion or the FCC how; Metricom also has purchased spectrum rights outside the Band.

After careful consideration of all alternatives suggested to it and several that it conceived internally, Fusion has concluded that RF Lighting and current Spread Spectrum designs cannot both use the Band. The two are fundamentally incompatible in the same spectrum. Moreover, no short- or long-term technical opportunity for compatibility can exist because RF Lighting requires commodity magnetrons and ferroresonant power supplies and current Spread Spectrum systems will not tolerate a few watts of focussed emissions. Fusion does expect future generations of RF Lamps to use solid-state sources that will eliminate both magnetrons and ferroresonant power supplies that could do the same for microwave ovens), but those products are five years and several hundred million dollars away at best. To bring them about, Fusion and RF Lighting must address current lighting markets with current technology under the historical premises for use of the Band.

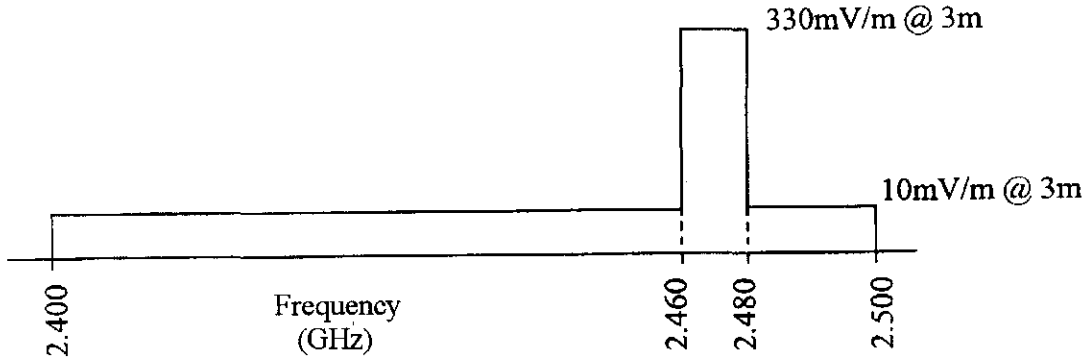
If Spread Spectrum systems cannot use the Band at levels of power and processing gain that assuredly maintain peak performance when operating in close physical proximity to RF Lamps, then either Spread Spectrum communications or RF

Lighting must move spectrally (or disappear entirely). RF Lighting cannot move; technical and economic absolutes simply eliminate any such option, and in any case it has the prior, senior rights where it is. However, Spread Spectrum systems can operate readily in unlicensed spectrum at 5.8 GHz, 915 MHz and other frequencies that are allocated or available to such uses.

The Band is attractive to Part 15 because it is free, wide and global, all of which have followed from its creation by treaty and its long-standing reservation for non-communications use primarily. Although it would cost many billions of dollars, Part 15/MSS interests can, and can afford to, purchase or otherwise acquire licensed spectrum that meets their need, as other communications interests have done. The high cost of purchasing unfettered access to equivalent spectrum is the best measure of their audacity in seeking to eliminate RF Lighting as a no-cost alternative. The FCC should not contemplate so massive a gift to the world's richest companies and individuals, even if it believes that their convenience should now dominate the previously senior industrial, scientific and medical uses of the Band, and even if it believes that it has authority to abrogate treaties. In that case, communications rights in the Band should be auctioned competitively, with proceeds compensating the public for its enormously valuable asset after providing for the loss of Fusion's large investment and opportunity in RF Lighting and for the investment that it would have to make to develop and deploy non-magnetron technology.

The Proposal

The Proposal would divide the Band into three segments. Part 15 devices would acquire priority in 60 MHz, RF Lighting would retain priority in 20 MHz and MSS systems would have priority in the remainder. RF Lighting would be located from 2.46 GHz to 2.48 GHz, subject to new limits on RF emission of 330 mV/m at 3 meters within that segment and 10 mV/m at 3 meters otherwise. RF Lamp emissions would be measured by the existing FCC-sanctioned averaging protocol. Figure 1 shows the proposed allocations and limits.



June 2, 1999 Proposal to Limit RF Lighting Emissions
Figure 1

As to the discrete elements of the Proposal, the "mini-band" for RF Lighting would be located so as to preclude the use of mass-produced magnetrons that are inexpensive, reliable, efficient and widely available, and it would be too narrow for RF Lamps to function. In an appropriate spectral location, RF Lighting could accommodate the magnitude of the proposed RF emissions limit with standard equipment that uses ferroresonant, full-wave rectified power supplies and, as proposed, is measured solely by the existing FCC-sanctioned averaging protocol.

Location of the Proposed RF Lighting "Mini-band"

The Proposal would force RF Lighting to use magnetrons that operate at a center frequency 20 MHz above that of the magnetrons that are made by the millions for use in residential microwave ovens. No such magnetron is commercially available, so far as Fusion is aware. The Part 15/MSS interests have acknowledged in writing that they do not have any knowledge of the technical feasibility, price or availability of any such magnetrons.

If a custom magnetron should be technically feasible, it could not offer the cost or availability of the commodity magnetrons that are now made by many dependable suppliers. One indicator may be the 1,750-watt 2M130 magnetron for commercial microwave ovens that is made and sold in quantities of tens of thousands annually. It costs approximately $150 from the manufacturer, which compares with the $20 and under that Fusion now pays for commodity magnetrons in relatively small quantities. After moderate provision for margin and distribution, such a custom magnetron would add nearly $200 to the cost of each RF Lamp; for perspective, competitive lamps, complete with ballast and fixture, can be purchased at wholesale for less than $300.

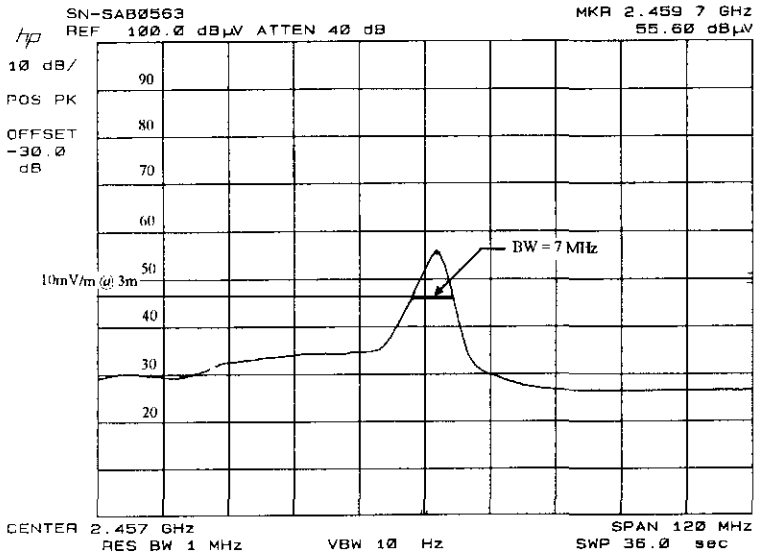
RF Lamps and technically similar industrial systems have used commodity magnetrons in the Band, safely and compatibly, since the 1970s, along with the microwave ovens which are their largest application. RF Lighting's competitors in general lighting – General Electric, Philips, Matsushita, and Osram/Sylvania -- produce millions of lamps a day and use their massive volumes to control costs and pricing. This is a significant barrier to entry for a new lighting technology. Fusion must leverage the availability of components already produced in high volumes to serve the lighting market at acceptable price points.

Bandwidth Required For RF Lighting

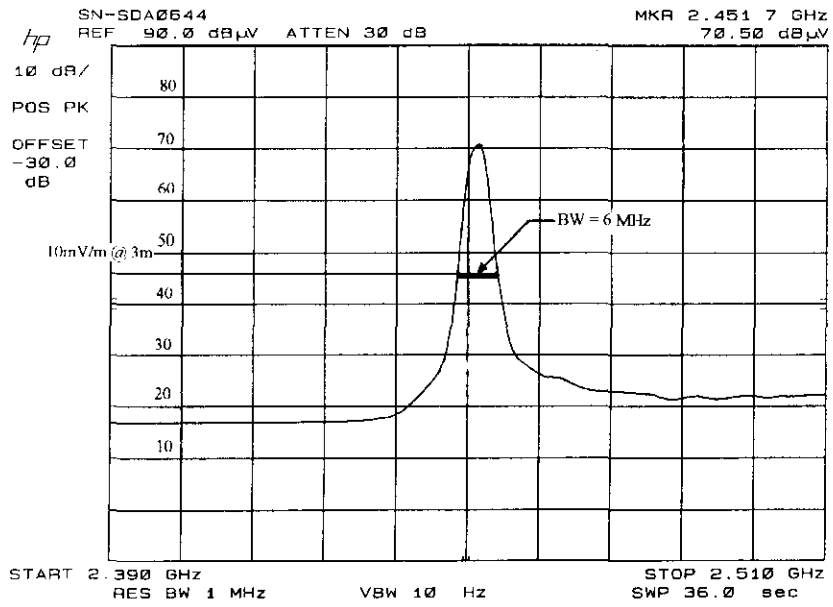
No set of components and measurement techniques known to Fusion can enable RF Lamps to function within the proposed 20 MHz bandwidth. Fusion discussed this aspect of the Proposal with a senior technical representative of the world's leading supplier of magnetrons, who said, "any such specification would eliminate every magnetron-driven product."

The minimum bandwidth required by RF Lighting is a function of the part-to-part variability of lamps and magnetrons, the drift in magnetron frequency that occurs over the lifetime of the lamp and the type of power supply used. The required bandwidth is also a function of the video bandwidth used to measure the RF spectra and the out of band limits that must be met. In Fusion's memorandum of May 17th, 1999 as revised May 28th, this analysis was presented in regard to the prior proposal, showing that the minimum bandwidth for RF Lamps powered by a full-wave rectified ferroresonant power supply is 69 MHz. The minimum bandwidth for RF Lamps powered by switching power supply was shown to be 34 MHz.

A similar analysis can be done in regard to the Proposal. The center frequency for microwave oven magnetrons varies by 15 MHz. The frequency of the magnetron will shift by three to four MHz over the lifetime of the lamp. From Figure 2A one can estimate the bandwidth occupied by the emission of a lamp powered by a ferroresonant full wave rectified power supply to be 7 MHz. Figure 2B shows that the bandwidth of a lamp powered by DC switching power supply is 6 MHz.

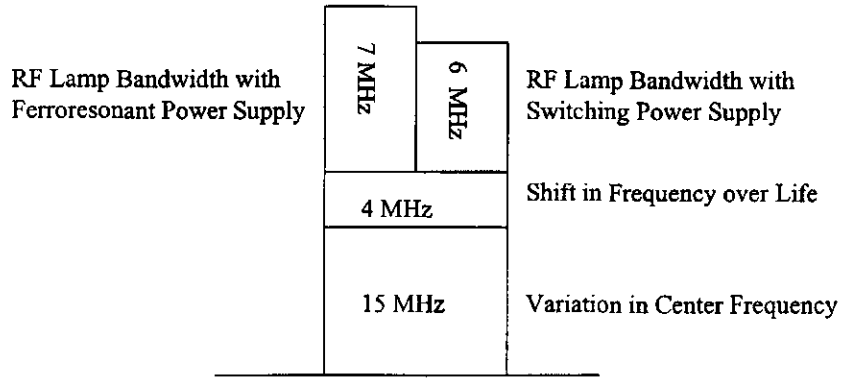


Bandwidth of Single Ferroresonant Powered Lamp Measured with a 10 Hz Video Filter
AFCL = 33.47 dB
Figure 2A



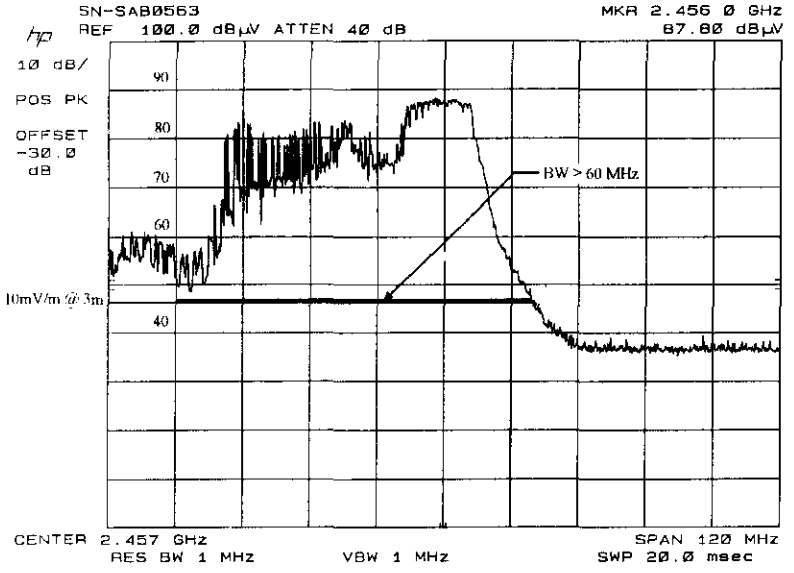
Bandwidth of Single Switching DC Powered Lamp Measured with a 10 Hz Video Filter
AFCL = 33.47 dB
Figure 2B

Combining these factors, one can estimate the minimum bandwidth required for a lamp driven by a ferroresonant full wave rectified power supply to be 26 MHz. A similar lamp powered by a DC switching power supply would require at least 25 MHz of bandwidth. These data are presented graphically below in Figure 3.

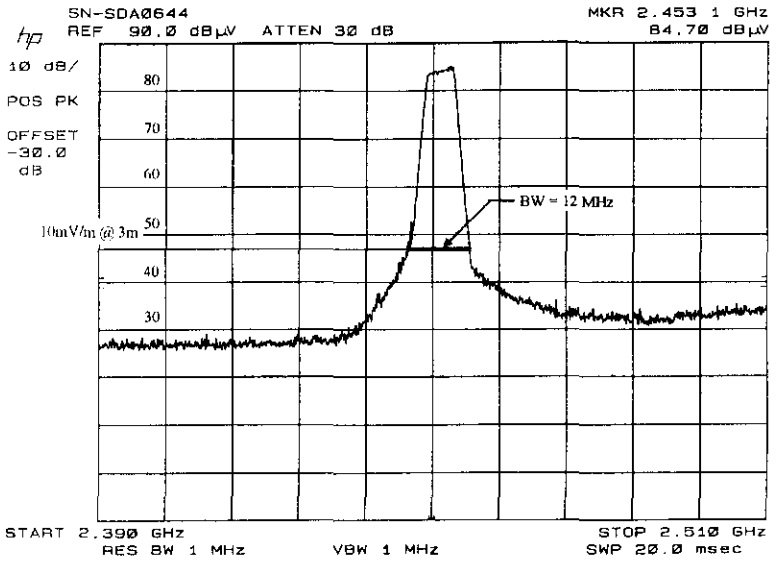


Minimum Bandwidth Required by an RF Lamp
Figure 3

In section 4.2 of their June 2nd memorandum, the Part 15/MSS interests write, "the actual operating bandwidth of an individual RF lamp should be less than 1 MHz". That statement is false. Figure 4A demonstrates that the bandwidth of a single lamp powered by a ferroresonant supply can exceed 60 MHz when measured with a 1 MHz video filter. Figure 4B demonstrates that the bandwidth of a lamp powered by an experimental DC switching power supply is 12 MHz when measured with a 1 MHz video bandwidth filter.



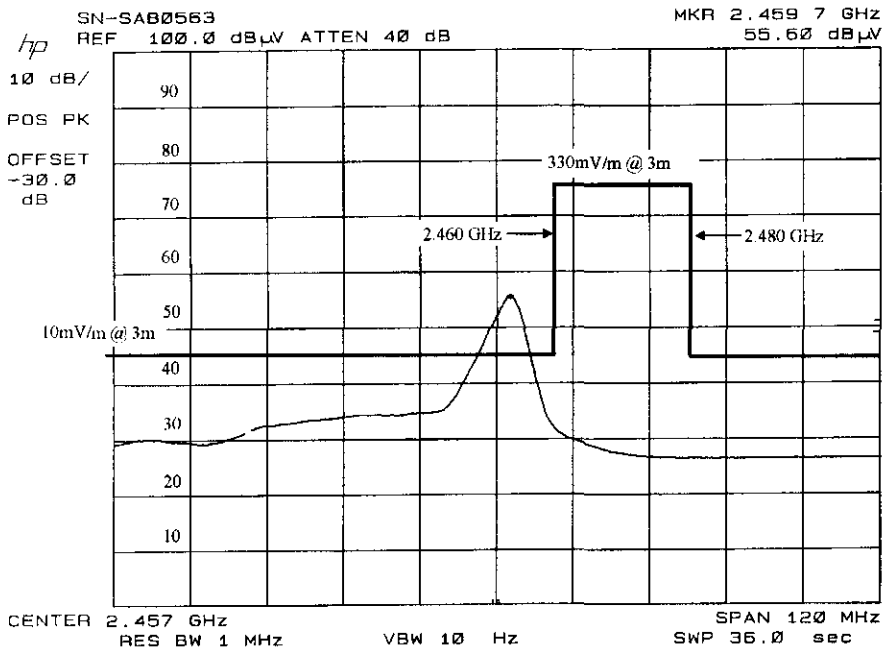
Bandwidth of a Single Ferroresonant Powered Lamp Measured with 1 Video MHz Filter
AFCL = 33.47 dB
Figure 4A



Bandwidth of a Single Switching DC Powered Lamp Measured with 1 MHz Video Filter
AFCL = 33.47 dB
Figure 4B

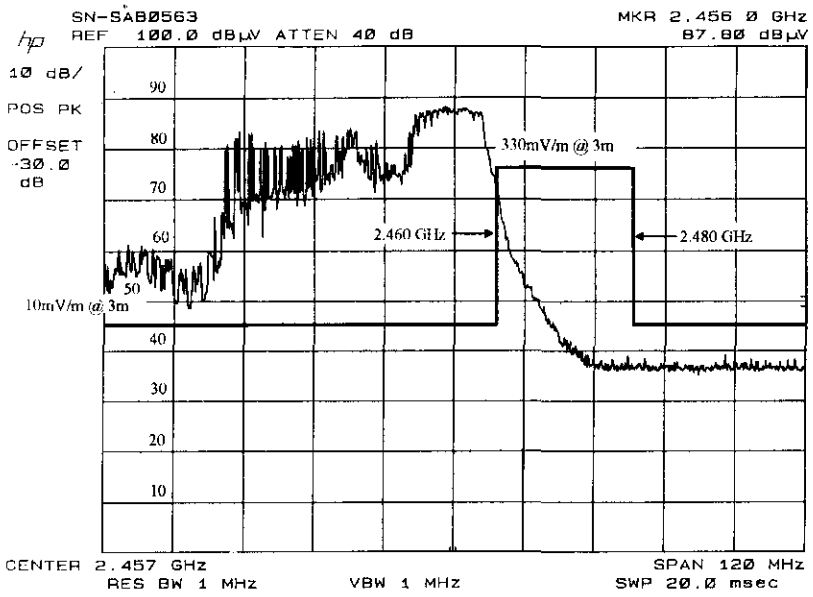
The Magnitude of the Proposed RF Limit

RF Lighting could accommodate the magnitude of the proposed limit on RF emissions by using ferroresonant-powered RF Lamps and the existing FCC-sanctioned averaging protocol. The Proposal would measure the RF emissions of RF Lamps using the averaging protocol, as the proponents confirmed in writing on July 8th. Superimposing the newly proposed limits onto the RF emission data that Fusion provided on May 17th shows the implications for RF Lighting. Figure 5A traces the average RF emission of a lamp powered by a ferroresonant, full-wave rectified power supply, using a video bandwidth of 10 Hz as per the FCC-sanctioned protocol. (Presented in May as Figure 2.) Disregarding the location of the RF peak, this particular lamp would meet the proposed standard.



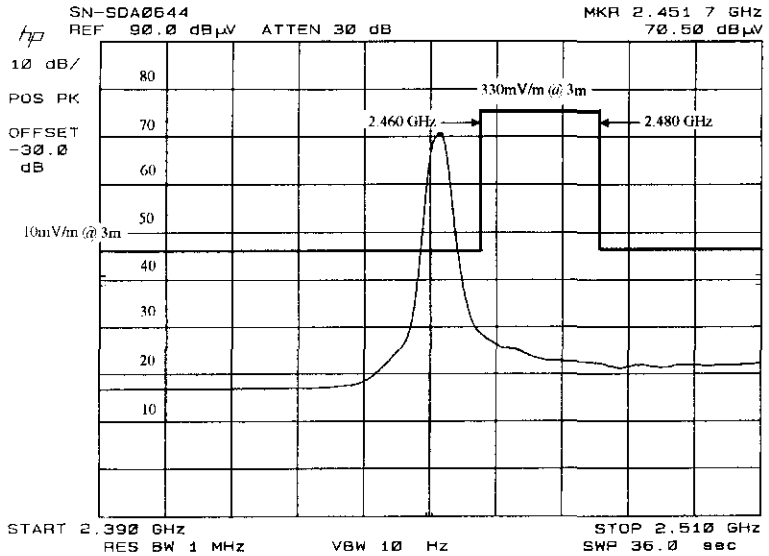
Lamp with Ferroresonant Power Supply Measured with 10 Hz Video Filter
AFCL = 33.47dB
Figure 5A

Emissions from the same lamp with the same power supply measured at the same time by the same instrumentation are shown in Figure 5B. (Presented in May as Figure 3.) The sole difference is the use of a 1 MHz video filter in order to find peaks rather than averages which radically changes the result. Using the 1 MHz filter, the peak is 32 dB greater than the average at the fundamental frequency and at least 45 dB greater away from the fundamental frequency.



Lamp with Ferroresonant Power Supply Measured with 1 MHz Video Filter
AFCL = 33.47 dB
Figure 5B

Figure 6 traces the average RF emissions of a lamp powered by a DC switching power supply. (Presented in May as Figure 4.) Again ignoring the location of the RF peak, this specific lamp also would meet the proposed limit. Comparing Figures 5A and 6, the ferroresonant, full-wave rectified power supply clearly would be the better choice.



Lamp with DC Switching Power Supply Measured with 10 Hz Video Filter
AFCL = 33.47 dB
Figure 6

Accommodating the magnitude of the proposed RF limit, however, would not eliminate or even slightly reduce the potential interference from RF Lighting that the Part 15/MSS interests said a few months ago would be intolerable. The proposed standard is meaningless, and known to its proponents to be meaningless, except as cover for the elimination of RF Lighting through the imposition of the other, technically and/or economically impossible elements of the Proposal, which would not reduce interference either. Unless the Part 15/MSS interests are misstating the susceptibility of Spread Spectrum devices to interference, their proposed RF emissions limit cannot be reconciled to the public record that they have created, including their own technical analyses. Here are a few examples:

> The Part 15/MSS interests assessed the RF signatures of three types of power supplies in Section 2 of their June 2nd memorandum, including a full-wave rectified, ferroresonant power supply like that measured by Fusion in Figures 5A and 5B. "The use of full-wave rectified power supplies without ripple suppression represents a worst case from a communications point of view," they concluded. This analysis and complaint is consistent with all previous statements by the Part 15/MSS interests, so far as Fusion is aware, but it is completely ignored by the standard that they proposed in the same document. That standard would not mitigate interference even in their "worst case" because the full-wave rectified ferroresonant lamp would meet the proposed standard (peak location aside), as shown both in Figure 5A above and in the same data that Fusion delivered to the Part 15/MSS interests in May.
>
> The Part 15/MSS interests' wrote March 2nd that an "in-band limit of 20 mV/m at 3 meters is the highest level [of RF Lighting emissions]that Part 15 communication equipment can tolerate". Subsequent inquiry brought clarification in writing that this meant a 20 mV/m ***peak*** level that was to be measured by a specified non-FCC protocol. Fusion next showed that non-FCC measurement protocol to yield 35dB to 45dB higher readings than the sanctioned method, data that remain unchallenged. The Part 15/MSS interests have now proposed an average limit that would be measured by the FCC-sanctioned averaging method, accepting a peak of 2000 mV/m now although 20 mV/m was not tolerable in March.
>
> Part15/MSS interests also wrote on March 2nd that a Part 15 receiver and a single RF lamp would have to be separated by at least 70 meters if peak emissions from the RF lamp were limited to 20 mV/m at 3 meters. Fusion advised them in May that the mean peak emission of the ferroresonant-powered RF Lamps tested by Fusion was 1,959 mV/m at 3 meters, data which have not been challenged. Since the Proposal would accept the average measurement protocol, and can be met by ferroresonant-powered RF Lamps (peak location aside), it is apparent that Part 15 receivers can now accept a peak

emission of 1,959 mV/m at 3 meters. Since the lamp and its RF signal are the same as they were, the ability of Part 15 equipment to withstand Part 18 interference was 100-fold understated in March or has improved 100-fold since.

The same information that Fusion delivered in May is sufficient to calculate that a mean of 360 meters' separation would be required between a single ferroresonant-powered RF Lamp and a Part 15 receiver, and that the separation required from some individual lamps would be significantly greater. These data have not been challenged; in fact, Fusion's estimate only confirmed that dated November 1998 by Bluetooth in ET Docket No 98-42. Anders Svensson of Ericsson Mobile Communications AB on behalf of Bluetooth estimated an interference radius of 308 meters from a single lamp. Public statements by senior technical employees of Texas Instruments and Lucent Technologies generally agree, also, as per the letter dated July 19, 1999.

Both Fusion's and Bluetooth's estimates were extremely conservative, and Fusion believes for several reasons that a significant level of interference with Part 15 receivers will occur even at separations of a half-mile or more. Fusion assumed a linear field attenuation at 2.45 GHz and a ten-inch diameter reflector for light pipes, giving forward to backward signal gain of only 6dB. Reflectors for RF Lighting floodlights and downlights have larger openings and are higher-gain antenna, increasing the required separation to from a single RF lamp to 704 meters on average. And finally, Fusion's May estimate assumed only a single lamp per installation in order to be consistent with Part 15/MSS assumptions; multiple-lamp installations are the norm, however, and thousands can be concentrated in a large factory, street lighting system, airport, arena or shopping mall. Under these circumstances, whether the current rules or any of the Part 15/MSS proposals are used, the physical separations that would assure non-interference would eliminate any coherent market for at least one and possibly for both of these potentially ubiquitous technologies.

Power Supplies

Ferroresonant power supplies can be made at moderate cost of $75 to $150 and are competitively available to OEMs like Fusion from numerous suppliers. They are typically over 90 percent efficient and offer operating lifetimes of 45,000 to 60,000 hours, characteristics which define the threshold of competitiveness in the high-wattage lighting market. The cost structure and technology of these power supplies define price and performance expectations in the high-wattage lighting market, particularly so for the high-intensity discharge ("HID") lamps that are most directly competitive with RF Lamp products. If ferroresonant power supplies were prohibited, Fusion could not continue in high-power RF Lighting.

Fusion's direct experience has shown that no DC switching power supply is commercially available that remotely approximates the cost and performance characteristics required by RF Lighting. In their June 2nd memorandum, the

Part 15/MSS interests stated glibly that DC switching power supplies are "economically feasible". When asked to identify sources and operating characteristics of such power supplies, they admitted in writing that they know of none. To Fusion's best knowledge, no DC switching power supply can operate RF Lamps with competitive reliability, efficiency and cost in commercial environments. Further, Fusion is aware of no commercially available switching power supply with lifetimes approaching even 5,000 hours or robustness that will allow it to be installed reliably outside clean, thoroughly protected environments. Further still, even with state-of-the-art electronics, an unreliable, short-lived switching power supply would cost $400 to $500 more than a ferroresonant supply. Allowing for reasonable margin and distribution cost, such a power supply would increase the end-user price of a single RF Lamp by approximately $1,200, which is four to eight times the price of a complete lamp system from a competitor.

Fusion has worked closely with several large, sophisticated manufacturers to identify and/or to develop an effective switching power supply for RF Lighting. So far, each has failed completely and at considerable cost. It is uncertain when or whether success can be achieved at any cost.

Suggestions

Part 15/MSS interests should turn their attention to re-engineering Spread Spectrum devices rather than RF Lighting. Although they have proposed none to date, they may have extensive engineering options that would enable their devices assuredly to maintain peak performance in close physical proximity to RF Lamps, including narrowing the channel bandwidth of frequency hopping systems and increasing the processing gain of direct sequence systems. Despite inquiry, and despite Fusion's provision of extensive RF Lighting data, the Part 15 interests have refused to open their technologies to examination by interested parties. However, Metricom, one prominent member of the Part15/MSS group, anticipating a $950 million inflow from MCI WorldCom and Vulcan Ventures/Paul Allen, said the following on Form 8-K as recently filed with the Securities and Exchange Commission:

> "If the FCC chooses not to limit the power generated by RF lighting devices in the 2.4 GHz band, RF lighting devices could interfere with [Metricom's] operations . . . [but] we believe we could overcome such interference...."

Fusion twice asked Metricom to reveal how it could overcome such interference and whether it has advised the FCC of its belief. No response was received and Fusion cannot now compel one. Each of the Part 15/MSS interests should immediately disclose all possible options which might solve the problem that they have created. These questions are particularly timely and relevant as to Metricom and Bluetooth, which have announced imminent plans for massive distribution and installation of Spread Spectrum receivers that assuredly cannot tolerate RF Lamps at ranges of 300 meters to a half-mile or more.

For technical, legal and equitable reasons, vulnerable Spread Spectrum must not be allowed into the field. ***If planned distribution proceeds, Spread Spectrum will eliminate any coherent market for RF Lighting, but will be hostage to ordinary RF Lighting users and photo-terrorists, both acting within the law. Both markets may be lost.*** In 1985, in Docket No. 81-413 (First Report & Order), the FCC reduced the power of Spread Spectrum devices below the levels proposed by NTIA specifically to avoid requests by Part 15 users for protection from ISM devices. The FCC also has stated repeatedly that the frequency hopping and processing gain rules are designed to harden Spread Spectrum systems against interference from ISM devices. Given the facts that the Part 15/MSS interests have acknowledged, the FCC is formally on notice that a catastrophic failure of spectrum management lies immediately ahead. Rather than entertain rule changes that would eliminate RF Lighting and turn the historical rights and premises for use of the Band upside down, the FCC should reaffirm the premises under which it admitted Part 15 users. It should ensure that all Part 15 uses of the Band are fully compatible with RF Lighting, and that all devices that are certified and distributed are assuredly capable of peak performance in close physical proximity to RF Lamps.

Absent a technical option unknown to Fusion, Spread Spectrum and RF Lighting cannot coexist in the Band. One technology or the other must move to another region of the spectrum or disappear entirely. Mass-produced magnetrons and ferroresonant power supplies dictate that RF Lighting operate in the Band, where it is fully compatible with microwave ovens and all traditional users, and which it has the long-standing, senior right to do. Spread Spectrum devices clearly can operate in other regions of the spectrum, however. Fusion understands that spectrum in the 5.8 GHz region has already been allocated to accommodate the Part 15/MSS interests. Other higher-frequency alternatives exist at 24 GHz, which has been assigned for Part 15 use and could easily accommodate Spread Spectrum communications, and between 57GHz and 67 GHz. The lower-frequency ISM bands are alternatives, too, as listed in Table 1.

U.S.A	Europe	Japan
915 MHz	433 MHz	
40 MHz	40 MHz	40 MHz
27 MHz	27 MHz	27 MHz

Alternative ISM bands
Table 1

Part 15/MSS interests have stated that 5.8 GHz equipment would be more expensive and less efficient than 2.45 GHz equipment because 5.8 GHz components are less readily available; of course, this would change if Spread Spectrum systems moved to the higher frequency. They also say that the communication equipment that is being developed for use at 5.8 GHz is targeted at a different market. Spectrum devices operating outside the Band would not have to compete with commercial magnetrons, and at the lower frequencies would benefit from the maturity of RF communication technologies long since developed. Again, the Part 15/MSS interests are large, rich, sophisticated companies and the Spread Spectrum market is both enormous and nascent, so it is clearly within their power to make this change today. The multiplicity of their

options contrasts starkly with the digital choice for RF Lighting: it can do what it does where it does it, or it can disappear.

The Band is attractive because it is free, wide and global. All of these are artifacts of the Band's creation by treaty and its preservation primarily for non-communications use. It would cost many billions of dollars, but Part 15 Spread Spectrum interests can, and can afford to, purchase or otherwise acquire licensed spectrum that meets their need. Other communications interests have done it. (Metricom itself has purchased a few MHz covering a limited population, which may be its undisclosed means to overcome RF Lighting interference without FCC action.) The difference in cost is the best measure of the audacity of their plan. On the one hand, they can pay out billions of dollars; on the other, they can attempt to co-opt the FCC into cleansing the Band of RF Lighting and get the same benefits at no cost. The FCC should not contemplate so massive a gift to the world's richest companies and individuals, even if it believes that their convenience should now dominate the previously senior industrial, scientific and medical uses of the Band, and even if it has unilateral authority to abrogate treaty obligations. In that case, communications rights in the Band should be auctioned competitively, with proceeds compensating the public after providing for the loss of Fusion's large investment and opportunity in RF Lighting and the investment that it must make to develop non-magnetron technology.